

NAVAL MEDICAL RESEARCH AND DEVELOPMENT NEWS

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NAMRU-3 Hosts Jordanian Military Royal Medical Services for Training

By Capt. John Gilstad, NAMRU-3 commanding officer



(From left to right) NAMRU-3's Commanding Officer Capt. John Gilstad gave training certificates to Jordanian officers Capt. Sawzan Abdel Dayem and Second Lt. Ghandy AL Msarwa, Ghada Ismail and Zain Abou-Nouar. Others pictured are VZDRP's Mary Younan, MSc., the project's principal investigator, and Lt. Cmdr. Gabriel Defang, VZDRP's Head. (Photo by Rafi George)

CAIRO – U.S. Naval Medical Research Unit No. 3's (NAMRU-3) Viral and Zoonotic Diseases Research Program, headed by Lt. Cmdr. Gabriel Defang, hosted four Jordanian military key laboratory personnel for a workshop as part of the Department of State-funded FY16 project: Enhancing Biosafety, Biosecurity and Diagnostic Capacity at the Royal Medical Services Hospital System in Jordan.

The Royal Medical Services (RMS) in Jordan offers health care services to thousands of patients of military/police forces as well as Jordanian civilians. Given the critical role RMS plays in national public health security, NAMRU-3 partnered with the Department of

State's Biosecurity Engagement Program to enhance the pathogen detection capability of the RMS laboratory, and advise on the development of a structured, integrated biosafety/biosecurity program to reduce bio-risk challenges.

Aiming to enhance the capacity of the RMS laboratory to safely handle, detect, contain and secure highly pathogenic viral agents including Arboviruses; severe human and zoonotic influenza viruses; and Coronaviruses, including MERS-CoV, NAMRU-3 hosted the military medical officers for training, May 22-26, 2016.

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NMRC Commanding Officer's Message

Navy Medicine is highlighting the month of July as “Health Innovation Month,” giving us an opportunity to share stories of how new technologies, products and inventions can improve the health of the warfighter. Many might be unaware the Surgeon General runs a health innovation cell at the Bureau of Medicine and Surgery – the *Navy Medicine Futures and Innovation Office*. The mission of this office is to provide an unfiltered conduit for innovative ideas from the deck plate on topics ranging from sustaining critical skills to digital medicine. Just this week I had the opportunity to discuss with the outgoing Director, CDR Hassan Tetteh, ways in which our R&D commands might participate in this exciting initiative.

The [Navy Medicine Research and Development](#) enterprise uses healthcare technology as a cornerstone on multiple projects. The Naval Submarine Medical Research Laboratory (NSMRL) is using technology to investigate the microbiome of deployed submariners in an effort to identify wellness and mental health risk. The U.S. Naval Medical Research Unit-San Antonio (NAMRU-SA) is promoting utilization of online and mobile app-based resources to provide audio-guided meditation for staff to improve mindfulness and decrease stress, as well as promoting the use of a virtual, multimedia trainer to improve fitness. The U.S. Naval Medical Research Unit-3 Cairo (NAMRU-3) is using emerging technology to improve far-forward detection of emerging disease through the validation of microfluidic, multiwell PCR to enhance screening for multiple febrile-illness-causing pathogens.

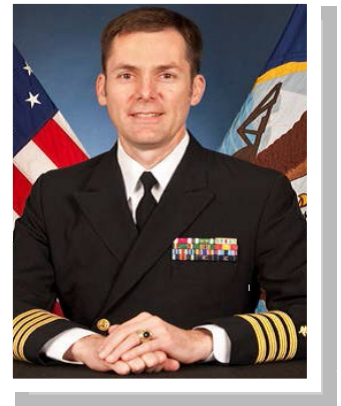
In Lima, the U.S. Naval Medical Research Unit No. 6 (NAMRU-6) is working with industry to develop qualitative *in vitro* immunochromatographic tests against new world cutaneous leishmaniasis, conducting treatment trials with repurposed FDA approved drugs for military relevant diseases. U.S. Naval Medical Research Center—Asia (NMRC-Asia) is developing novel point of care diagnostic tools to identify biomarkers as an early predictor of dengue severity. The Naval Health Research Center (NHRC) is developing a smartphone application to prevent prescription medication misuse by military personnel in support of force health readiness. At the Naval Medical Research Center (NMRC), our work in bioinformatics and next generation sequencing enables advances in the areas of precision medicine by having the complete genetic content

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NAMRU-3 Commanding Officer's Message

Expanding and strengthening partnerships is one of the three overarching goals of our Surgeon General's 2016 Commander's Guidance, and one of four Lines of Effort in the CNO's 2016 Design for Maintaining Maritime Superiority. Here at U.S. Naval Medical Research Unit No. 6 (NAMRU-3) Cairo, we have two initiatives underway to broaden our partnerships in Egypt: a campaign to open doors for collaborative research with Egyptian military medicine, and a partnership with Stanford University through which we are strengthening our links with Egyptian academia. For historical, practical and Egyptian governmental reasons, NAMRU-3's position in Egypt has been almost exclusively aligned with the Ministry of Health. To develop stronger ties with Egyptian military medicine, our first steps have included military senior leader engagements and appreciative inquiry about potential grounds for partnership. The first fruit of this effort, scheduled for mid-September, is an expert exchange on battlefield trauma buddy care and resuscitation training under the leadership of the Defense Institute for Medical Operations (DIMO). Our part is briefing the DIMO team on NAMRU-3's research portfolio and visiting the training site. The project positions us for follow-up conversations on research-related ideas, both with Egyptian counterparts and with our own security cooperation colleagues at US Embassy, NAVCENT, and CENTCOM. These ideas include (1) shipboard communicable disease control, including Egypt's new Mistral class ships, (2) study of antimicrobial resistance in Egyptian operational settings, and (3) enhancing sentinel infectious disease surveillance among military forces exercising and operating in the region. NAMRU-3 established an Education Partnership Agreement in 2015 with Stanford University's Center for Innovation in Global Health. This summer, we built a strong consortium including Cairo University cardiovascular and Ain Shams University water engineering faculty to pursue DoD Center for Global Health Engagement funding for implementation research on brackish groundwater photovoltaic desalination and its health effects. The project dramatically leverages Stanford's deep bench in engineering and global health, creates opportunities for Navy engineering partners in the CEC and possibly ONR, and will advance knowledge on provision of potable water for humanitarian assistance, disaster relief and DoD stability operations.



NAMRU-3 Commanding Officer sends,
John Gilstad
CAPT, MC, USN

NMRC Commanding Officer's Message

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of an individual's samples, leading to novel treatments such as the development of therapeutics derived from sewage. Finally, see page 19 to learn more about how a new device capable of multi-axis motion in yaw, pitch, roll, and heave while undergoing planetary and linear accelerations is providing unmatched authenticity in vehicular motion to conduct aeromedical human subject's research.

For decades, the Navy Medicine Research and Development enterprise has been at the forefront of utilizing technology and innovation to develop products and advance science. I look forward to connecting with Navy and sister service colleagues at the upcoming Military Health Research Symposium (MHSRS) conference next month where we can share stories on the groundbreaking work we are conducting to improve care to the warfighter.

NMRC Commanding Officer sends,
Jacqueline D. Rychnovsky

NAMRU-3 Hosts Jordanian Military Royal Medical Services for Training

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Training focused on the basic concepts of biosafety in laboratories including waste management and safe handling of potentially highly infectious specimens.

The NAMRU-3 team emphasized the paramount importance of integrated biosecurity program implementation as well as common challenges.

Training sessions consisted of classroom instruction and role-play scenarios.

The team also introduced the visiting officers to a commercially-available PCR-based diagnostic platform that NAMRU-3 will be providing, as well as testing algorithms for MERS-CoV diagnosis and Influenza subtyping. Hands-on training also featured serological methods to detect Arboviruses, with a focus on West Nile and Dengue viruses.



Lt. Cmdr. Gabriel Defang (4th from left) and Lt. Nathaniel Christy (4th from right) following MERS-CoV hands-on molecular training of Jordanian officers in NAMRU-3's Viral and Zoonotic Diseases Research Program (VZDRP) diagnostic laboratory, being provided by VZDRP staff Manar Imam, MSc. (standing 3rd from the right) and Omar Nowar (standing 2nd from the left). (Photo by Rafi George)

Mary Younan, the project lead at NAMRU-3, said "The workshop was a great opportunity for us and our Jordanian colleagues to identify and discuss the current gaps in their virology diagnostic systems so NAMRU-3's collaboration can focus on these specific goals."

At an informal ceremony on the last day, the visiting officers expressed sincere appreciation of the review of viral pathogens and the up-to-date tools of diagnosis they acquired. NAMRU-3 colleagues expressed their satisfaction in being able to assist, and were obliged by the fruitful scientific collaboration mediated by the new technology.

NHRC Launches Norovirus Vaccine Trial

Story from Naval Health Research Center Public Affairs

SAN DIEGO – The Naval Health Research Center (NHRC) launched a clinical trial at Recruit Training Command (RTC) to evaluate the effectiveness of the first norovirus vaccine in reducing outbreaks of acute gastroenteritis, June 14, 2016.

Currently, there is no vaccine to prevent norovirus, a highly contagious disease that causes vomiting and diarrhea and can infect anyone who comes into contact with the pathogen. The virus can be spread by infected people, contaminated food or water, or contact with contaminated surfaces, making populations living in close proximity, like military recruits, more susceptible to outbreaks.

“Norovirus is the largest cause of acute gastroenteritis in the United States,” said Cmdr. Dennis Faix, preventive medicine physician at NHRC. “Military recruits are particularly vulnerable to the disease with recruits living side by side in the barracks. RTC has experienced outbreaks in recent years, which can significantly impact training populations, disrupt training schedules, and has the potential to cause long-term health consequences.

Extensive safety testing for this vaccine has been performed in civilian populations, but because the recruit training population regularly experiences large outbreaks of norovirus, it is a perfect place to test the effectiveness of the vaccine for the military,” explained Faix.

According to Lt. Cmdr. Lori Perry, preventive medicine physician and study co-investigator at NHRC, recruits entering basic training at RTC will be contacted during in-processing and researchers will explain the study. Interested recruits will be asked to volunteer and they can choose to stop participating at any time.

Once informed consent has been obtained and study volunteers are vaccinated, they will have three brief follow-up visits during basic training to have blood collected and evaluated to determine how their immune system is responding to the

norovirus vaccine as well as other vaccines received during in-processing.

“The health and safety of our recruits is our top priority,” said Rear Adm. Stephen C. Evans, commander, Naval Service Training Command. “This trial will provide our recruits with the resources to stay healthy while they conduct their basic military training, which will better prepare them for service in the 21st century Navy.”

The vaccine trial will last up to one year, said Faix, with results contributing to the assessment of vaccine effectiveness to support approval by the U.S. Food and Drug Administration for widespread use among other U.S. military populations and civilians.

NHRC has led safety and efficacy studies for other vaccines, including one for adenovirus, a contagious respiratory illness, at U.S. military recruit training

centers. In 2007, NHRC collaborated with the FDA for an adenovirus vaccine clinical trial that resulted in the vaccine being reinstated at recruit training centers in 2011. Adenovirus was the most prevalent and widely spread virus in military training environments, infecting up to 80 percent of recruits prior to the vaccine being reinstated, resulting in lost training time and increased medical care; after 2011, adenovirus cases went from 250 each week to two.

As the DoD’s premier deployment health research center, NHRC’s cutting-edge research and development is used to optimize the operational health and readiness of the nation’s armed forces. In proximity to more than 95,000 active duty service members, world-class universities, and industry partners, NHRC sets the standard in joint ventures, innovation and translational research.



GREAT LAKES, Ill. (Nov. 17, 2015) Recruits at Recruit Training Command (RTC) standby to receive immunizations at Capt. James A. Lovell Federal Health Care Center. RTC, the Navy’s only boot camp, trains over 40,000 volunteer civilian recruits annually, transforming them into Sailors. (U.S. Navy photo by Mass Communication Specialist 2nd Class Nicolas C. Lopez/Released)

Researchers Collaborate with Malaysian Partners to Better Understand the Threat of MERS

From Naval Medical Research Center – Asia Public Affairs

SINGAPORE - Since its appearance in 2012, the Middle East Respiratory Syndrome (MERS) virus has emerged as a serious public health threat of global concern. The World Health Organization (WHO) has been notified of 1,626 laboratory confirmed cases and the case fatality rate is estimated at approximately 36 percent. Beyond its high fatality rate, significant concern lies in the potential for the MERS virus to spread beyond the Middle East, as was recently witnessed in the Republic of Korea which saw an outbreak of 185 confirmed cases and reported 36 deaths. The spread of the MERS virus may be facilitated by high population mobility and mass gatherings such as the Hajj pilgrimage that an estimated 2 million Muslims make each year to the region most impacted by the virus. Indeed, two of the most frequently visited cities during the Hajj, Mecca and Medina, have contributed nearly 10 percent of the known cases to the present epidemic, according to the WHO.

Despite the global health community's intense focus on MERS since its emergence, many questions remain unanswered, such as the breadth of the current epidemic in the Middle East and the number of asymptomatic cases that go undetected by current surveillance activities. A recent collaboration between Navy Medicine researchers and partners in Malaysia aims to address some of these unanswered questions.

Led by Lt. Brian L. Pike of the Naval Medical Research Center – Asia (NMRC-A) based in Singapore, the project aims to establish a multi-year cohort of Hajj pilgrims traveling between the Middle East and Malaysia, a Muslim-majority country that sees tens of thousands of its citizens travel to the Middle East each year. Within this cohort, serological analysis of pre- and post-travel blood samples will be paired with questionnaire data to better estimate the risk of exposure to the MERS virus during travel to the region most affected and assess the potential for the virus to spread beyond the Middle East.

This work, which recently received funding from the Armed Forces Health Surveillance Center's Global Emerging Infections Surveillance and Response System (AFHSC-GEIS), is being conducted in collaboration with the University of Malaya's Tropical Infectious Diseases Research & Education Centre (TIDREC). TIDREC is a research center dedicated to the advancement of knowledge in tropical infectious diseases in Malaysia, focusing especially on neglected tropical infectious diseases that have the potential impact on the global community.

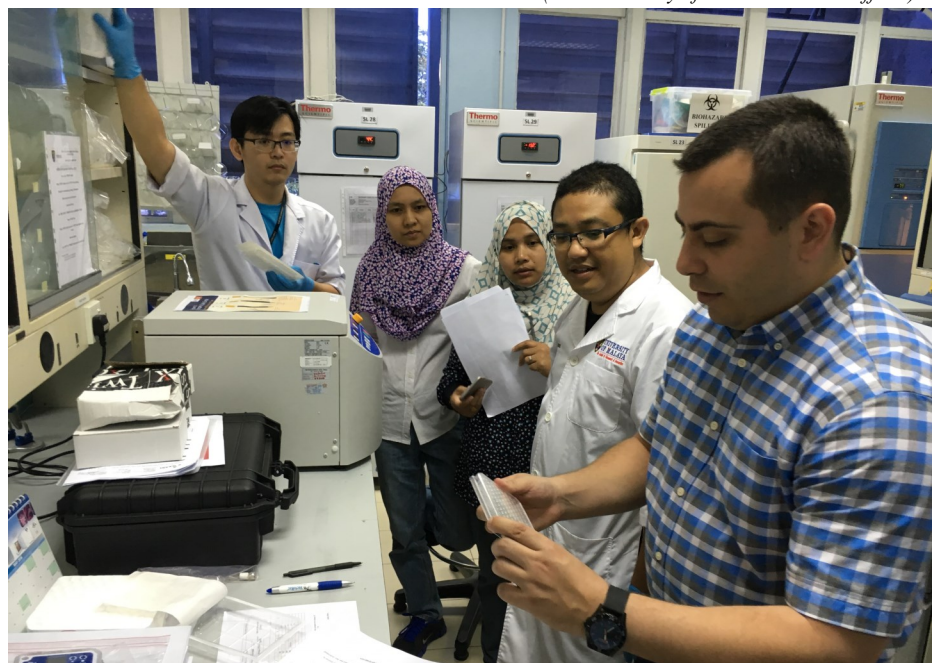
Dr. Sazaly Abubakar, TIDREC's Director and the study's Co-investigator, speaking of the study said, "This study aims not only to address important scientific questions about the threat that the MERS virus poses to Malaysia, it also represents an excellent opportunity to expand upon the strong collaborative research relationship that TIDREC has with the U.S. Navy."

Most recently, leveraging the expertise at the Naval Medical Research Center's Viral and Rickettsial Diseases Department (VRDD), in Silver Spring, Maryland, Pike is joined by Lt. Jose Garcia and Mr. Dan

Ewing to train TIDREC personnel in a VRDD-developed method for determining whether or not an individual has had a prior exposure to MERS-CoV. The method, a microneutralization assay, detects the presence antibodies that the human body produces in response to a virus infection. Ultimately, this method will be employed in the larger study to assess how many, if any, of the Hajj pilgrims returning to Malaysia from Saudi Arabia were exposed to the MERS virus.

Garcia and Ewing spent a week in Kuala Lumpur, Malaysia, training TIDREC laboratory personnel. "It's opportunities such as this that demonstrate the true strength of the Navy Research Enterprise," Pike said, speaking of the training. He continued, "Having the technical expertise within our own research community to conduct this training has been invaluable to the MERS project and it's strengthened the important relationship we have with our Malaysian partners."

At right, Lt. Jose Garcia, from the Naval Medical Research Center is conducting a dry run of the assay protocol with TIDREC personnel prior to the training. This method will determine whether or not an individual has had a prior exposure to MERS. (Photo courtesy of NMRC-A Public Affairs)



The Research Behind PTSD Treatments

From Naval Health Research Center, Health and Behavioral Sciences

SAN DIEGO - Post-traumatic stress disorder (PTSD) can develop in active duty service members, veterans and civilians as a result of a traumatic event such as an accident, abuse or exposure to combat. Based on research, it is known people with PTSD often experience distress and problems at work, with loved ones, and in completing daily tasks. They are also at an increased risk of having other conditions such as depression or substance use problems, which further complicate their lives. However, not everyone who experiences a traumatic event will develop PTSD; approximately 20 percent of individuals who experience a traumatic event will meet criteria for PTSD at some point in their lifetime.

PTSD is a mental health condition and people often avoid seeking treatment. Current research shows fear of stigma, perceived inconvenience of treatment, and beliefs that treatment may not work are some of the most common reasons individuals do not seek help. Some may also avoid getting help because they don't know what to expect from treatment or because they don't want to talk about their traumatic experiences.

There is strong evidence treatment can be very beneficial for reducing symptoms and improving quality of life. Effective options include psychotherapy and medication, but alternative medicine approaches may also be beneficial. These may be used alone or combined to reduce PTSD symptoms and improve patient outcomes.

Psychotherapy

The type of PTSD treatment with the most scientific support is psychological treatment, especially evidence-based individual psychotherapies. The two state-of-the-science treatments recommended by the Department of Defense/Department of Veterans Affairs (DOD/VA) and the International Society for Traumatic Stress

Studies (ISTSS) Clinical Practice Guidelines are Cognitive Processing Therapy (CPT) and Prolonged Exposure (PE). These treatments are the most frequently studied for military-related PTSD. The treatments involve thinking about and talking through the traumatic memory and engaging in practice assignments outside of sessions to help promote recovery.

Present-Centered Therapy (PCT) is a psychological treatment that places less emphasis on the traumatic event. Emerging evidence indicates that PCT may be as effective as the existing, evidence-based PTSD treatments. Individuals who received PCT were also less likely to drop out of treatment compared to those who received CPT or PE.

Cognitive Behavioral Conjoint Therapy (CBCT) is a form of psychotherapy for PTSD that includes a friend or significant other in treatment with the patient. CBCT has been shown in research studies to improve both PTSD symptoms and relationship satisfaction.

Although approximately 49-70 percent of people who receive these treatments experience clinically-meaningful improvements, these psychotherapies do not work for everyone. Fortunately, there are other options.

Medication

The DoD/VA and ISTSS Clinical Practice Guidelines identify one type of medication, called selective serotonin reuptake inhibitors (SSRIs), as having the best evidence as a treatment for PTSD. Examples of SSRIs include sertraline (Zoloft), paroxetine (Paxil), citalopram (Celexa) and fluoxetine (Prozac). Other medications besides SSRIs may be helpful for specific PTSD symptoms, and all medications may have side effects. Patients should talk with their providers to determine which medications might be the best option for them.

Alternative Approaches

Researchers have begun to investigate alternative medicine approaches to treating PTSD. Alternative approaches studied to date include acupuncture, yoga, physical exercise and mantram repetition (silently repeating a spiritual word or phrase). Although more research is needed, initial results suggest some individuals experience a reduction in symptoms following alternative approaches, and more alternative treatment approaches for individuals with PTSD may be on the horizon. For example, researchers at the Naval Health Research Center (NHRC) are studying whether surf therapy relieves symptoms of PTSD and related problems such as depression.

Starting Treatment

Once treatment is started, it is important to know it may take some time before it begins to help. For some people, symptoms may get worse before they get better – although this increase is typically brief and temporary. This pattern is common with many types of treatment and it is important patients understand this so they do not to give up prematurely. Most people who receive treatment start feeling better within the first few months.

Patients still experiencing symptoms after being in treatment for several weeks or months should discuss their progress with their treatment provider. The DoD/VA Clinical Practice Guidelines recommend options including changing medication dose or treatment frequency, trying a different treatment approach, or getting a referral for other services.

While some individuals may recover from PTSD without medical intervention, treatment delivered by a qualified health care provider can help to reduce symptoms and improve daily living. Seeking professional assistance from a psychologist or psychiatrist can also help patients sort through the available treatment options to identify the ones best suited for them. Each patient should evaluate the available options and select the approach that seems to best fit his or her needs.

Thinking Outside the Clinic: Researching Novel Approaches to Improving Psychological Health

By Cindy Thomsen, Health and Behavioral Sciences, Naval Health Research Center

SAN DIEGO - When it comes to finding new ways to treat familiar illnesses and injuries, military medicine has always been on the frontline of the fight. This holds true whether the illness or injury is physical or psychological. Navy Medicine researchers are leading the charge to think beyond traditional treatments and explore innovative approaches for improving the mental health, well-being, and readiness of our active duty service members.

At the Naval Health Research Center (NHRC), personnel from our Health and Behavioral Sciences team and their collaborators are studying novel interventions to improve the mental health of service members.

Two approaches being explored seek to address post-traumatic stress disorder (PTSD) and depression. One area of research is a study examining the effects of surf therapy for PTSD, depression and related symptoms. The other addresses the challenge of treating patients with both PTSD and major depressive disorder

(MDD) by evaluating a new treatment approach combining two different, evidence-based interventions specifically targeting each condition.

Surf Therapy

When it comes to surf therapy, staff from the Naval Medical Center San Diego's (NMCSO) Wounded, Ill and Injured (WII) Wellness Program have a well-established program. They offer surf therapy as a six-week program to help wounded service members recover through physical activity. While surfing is used to promote recovery for these service members, few studies have examined surfing as a complementary form of therapy for physical and psychological symptoms.

NHRC researchers are partnering with NMCSO's WII staff to study whether surf therapy improves psychological and physical symptoms. Researchers want to know if can surfing as therapy improve health outcomes for patients with PTSD,

depression and related symptoms.

According to research, physical activity – cardiovascular exercise, resistance training and yoga – can positively impact mental health outcomes. Physical activity is also associated with improvements in specific conditions and symptoms such as PTSD, depression and pain. Research indicates physical activity can promote physiological changes that produce effects similar to those of antidepressants.

Studies suggest physical activity in a natural environment and with social interaction may have an even greater positive effect. Exercising in the presence of water was shown to have the greatest improvements in self-esteem and mood. Based on these findings, surfing would appear to be the perfect activity for a complementary and alternative medicine (CAM) approach to therapy to treat the psychological wounds of our service members.

Surfing also includes social interaction by providing the opportunity for surfers to interact with each other as they wait to catch the next wave. Surfing may also act as a form of group therapy.

To examine these potential benefits, NHRC researchers are working with the NMCSO team to explore both the immediate and long-term effects of the WII Wellness Surf Therapy Program on the health and readiness of active duty service members by assessing their psychological and physical symptoms over the course of the program. The team will assess patient satisfaction to fully evaluate the program. Findings from this study will help determine if surf therapy is a beneficial and viable form of treatment for patients with PTSD, depression and related symptoms.

The study is enrolling active duty service members who receive care in the NMCSO WII Wellness Surf Therapy Program includes nine self-report assessments before and after the six-week program and before and after each surf therapy session.

Staff from the Naval Health Research Center and Naval Medical Center San Diego's Wounded Ill and Injured Wellness Program prepare for their surf therapy study to examine surfing as a complementary form of therapy for physical and psychological symptoms. (Photo courtesy of Dan Howe)



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Thinking Outside the Clinic

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The study will not only provide a foundation for future program evaluation studies at other military hospitals and clinics, but also contributes to advancements in CAM approaches to treating our service members.

For patients, surfing is an activity many embrace as a life-long pastime, which may help service members maintain their gains over time and reduce the risk for relapse.

Leveraging the NMCSW WII Surf Therapy Program there is no additional demands on the military health care system. This is a win for service members, a win for military medicine, a win for readiness and a win for innovation.

Cognitive Processing Therapy (CPT) + Behavioral Activation (BA) Therapy

For service members and civilians, PTSD is often diagnosed with MDD, a combination associated with greater symptom severity, greater disability, more frequent health care visits and increased suicide potential. Despite the fact these two conditions often occur together, there is currently no psychological treatment specifically addressing both.

Patients with both PTSD and MDD often receive evidence-based treatments for



Cindy Thomsen (left) and Kristen Walter (right) discuss current mental health research studies at the Naval Health Research Center. (Photo by Mayra A. Conde)

PTSD such as cognitive processing therapy (CPT), a treatment recommended by the Departments of Defense and Veterans Affairs. While this, and other evidence-based PTSD treatments, typically reduces symptoms of both disorders, many individuals still have a diagnosis of MDD after completing treatment.

Researchers at NHRC and collaborators from NMCSW and Naval Hospital Camp

Pendleton are piloting a study that may offer a better way to treat service members with both PTSD and MDD.

Researchers developed a novel treatment program combining CPT with behavioral activation (BA), a standard treatment for depression. The goal is to determine if combining these two therapies

achieves a significantly greater improvement in depression symptoms than CPT alone.

NHRC researchers selected BA to enhance CPT in their novel treatment design because it is known to effectively reduce depression. Additionally, because it targets behavior, researchers anticipate it will complement the cognitive emphasis of CPT, which encourages patients to examine their trauma-related beliefs.

Researchers randomly assign patients to receive either CPT or the combined CPT and BA intervention. Study participants will complete clinician-administered and self-report PTSD and depression measures before and after treatment, including a three-month follow-up assessment. Additionally, participants will be asked to complete the self-report measures at each session in order to monitor their symptoms throughout the course of their treatment.

By looking beyond current and traditional therapy practices and examining novel approaches to treatments, researchers aim to improve the lives, functioning and readiness of active duty military.



Surfboards used for the Naval Health Research Center's surf therapy study. (Photo courtesy of Kristen Walter)

NAMRU-San Antonio Presented at ASM Microbe Meeting to Help Fight Drug Resistant Pathogens

From NAMRU-San Antonio Public Affairs

SAN ANTONIO – Navy scientists from the Naval Medical Research Unit San Antonio (NAMRU-SA) presented research on two different treatment approaches to help fight drug resistant pathogens at the first annual American Society for Microbiology (ASM) Microbe 2016 conference held in Boston, Massachusetts, June 16-20.

Nancy Millenbaugh, PhD., researcher and Principal Investigator in NAMRU-SA Maxillofacial Injury and Disease Department, and Matthew Kay, PhD., researcher in NAMRU-SA's Biomaterials and Environmental Surveillance Department talk with NAMRU-SA public affairs about NAMRU-SA presentations at ASM Microbe.

What is the ASM Microbe conference and why was NAMRU-SA's presence there important?

Dr. Millenbaugh: ASM Microbe is the premier international conference on antimicrobial agents and infectious diseases. Our presence there allowed us to see the most recent, cutting edge

microbiological research from around the world, presented in multiple types of formats, from posters and short slide presentations, to key note addresses and symposia. ASM Microbe also provided many, many opportunities to network and initiate potential new collaborations with scientists with similar research interests.

What did NAMRU-SA present at ASM Microbe?

Dr. Millenbaugh: Dr. Kirui presented research in a session keynote address on NAMRU-SA's laser project called "Novel Strategies to Help Antibiotics Play Their Role." Our results show that use of targeted gold nanoparticles with pulsed laser irradiation significantly increased the efficacy of gentamicin (antibiotic) against Methicillin-resistant *Staphylococcus aureus* (MRSA) biofilms. Imaging data indicates this combination treatment damages and loosens the biofilm matrix and cells so the antibiotic can easily reach the cells (the site of action). These exciting results demonstrate targeted laser therapy as a promising

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Dickson Kirui, Ph.D., (center) biomedical engineer in NAMRU-SA's Maxillofacial Injury and Disease Department, was a keynote speaker for the session called, "Novel strategies to help antibiotics play their role," at the first American Society for Microbiology (ASM) Microbe 2016 conference held in Boston, Massachusetts this June. Kirui presented the NAMRU-SA study titled, "Gold Nanoparticle-assisted laser therapy for enhancement of antibiotic efficacy in methicillin-resistant Staphylococcus aureus," and was joined by co-authors Gregor Weber, Ph.D. (right), and Principal Investigator, Nancy Millenbaugh, PhD (left). (Photo courtesy of NAMRU-SA Public Affairs)

NAMRU-San Antonio Presented at ASM Microbe Meeting to Help Fight Drug Resistant Pathogens

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new adjuvant approach to enhance the effectiveness of traditional antibiotic regimens against biofilms, which are known to be highly resistant to antibiotics.

How did attendees respond to the NAMRU-SA presentation on the use of targeted gold nanoparticles?

Dr. Millenbaugh: The slide presentation was very well received. Dr. Kirui received positive comments from the moderator and audience members and generated some good questions. One of the other presenters approached us to express interest in a potential collaboration.

What were the key points of discussion with the audience?

Dr. Millenbaugh: A researcher interested in using heat to kill biofilms asked if we are able to measure temperature change during laser therapy. One of the advantages of this technology is that the thermal and acoustic pressure changes generated are hypothesized to occur on a nanosecond time scale due to the fact we are using a nanosecond pulsed laser system. Also, use of a targeting molecule on the 40-nm gold nanoparticles localizes these effects to the bacterial cell wall (nanometer sized area). Taken together, this means the anti-biofilm effects are localized to the bacteria and biofilm matrix and there should be less damage to the host tissue caused by heat. We do not have the technical capability to measure any temperature change in our exposure system but this could be further studied through use of computational modeling.

Other strategies discussed in the session included use of nanocomposites of curcumin, chitosan, and silver to control antibiotic resistant bacteria, inhibition of drug efflux pumps by titanium dioxide nanoparticles or synthetic ion channels to enhance antibiotic efficacy, carbon monoxide-releasing molecules have synergistic antibacterial effects when combined with antibiotics, use of metal ions (copper, zinc, or silver) to block activity of enzymes responsible for antibiotic resistance, and use of novel agents to reverse antibiotic resistance.

What is the difference between the NAMRU-SA keynote session presentation and the poster session presentation at ASM Microbe?

Dr. Millenbaugh: The basic underlying mechanisms of the two treatment approaches are different. Dr. Kirui's talk was based on the team's study of targeted antibody-conjugated gold nanoparticles dispersing a *Staphylococcus aureus* biofilm using an energized short-pulse laser system. Other researchers presented data that mainly dealt with using continuous-wave laser systems to kill bacteria in planktonic culture. This approach runs the risk of generating heat around healthy tissue and potentially causing collateral damage. The NAMRU-SA team's efforts utilized *in vitro* biofilms that are more representative of the challenges encountered in clinical settings.

Dr. Kay: Our team's poster "Characterization of antimicrobial peptides for treatment of *Pseudomonas aeruginosa*" dealt with screening a pool of various antimicrobial peptides against laboratory and clinical *Pseudomonas aeruginosa* strains to find the best candidate which could be used in a variety of different environments with the least amount of cytotoxicity to mammalian cells.

The discussion the poster session addressed antimicrobial peptides (AMPs). AMPs seem to be a viable alternative to antibiotics for drug resistant *Pseudomonas aeruginosa*, based on media growth environment in different culture media, the presence of biofilms, and also relative cytotoxicity to mammalian cells.

Multidrug-resistant (MDR) bacterial infections have become an increasing concern for military leaders. What is unique about AMPs that make them less likely to induce bacterial resistance than conventional antibiotics?

Dr. Kay: *Pseudomonas aeruginosa* is an opportunistic pathogen and is associated with MDR infections. Novel antimicrobial and antibiofilm compounds whose mechanism of action differs from traditional antibiotics are necessary because biofilms of *Pseudomonas aeruginosa* are often multidrug-resistant.

AMPs are generally short, positively charged and amphiphilic peptides that provide potent, broad-spectrum activity against microbial infections. AMPs display various antibacterial action mechanisms including membrane permeabilization and interaction with intracellular targets. Due to their unique multidirectional mode of action and broad-spectrum activities, AMPs are less likely to induce bacterial resistance than conventional antibiotics and are considered as promising alternatives.



Harnessing the Power of Big Data for Medical Informatics

By Mike Galarneau, Director for Operational Readiness, Naval Health Research Center

SAN DIEGO—"Big data" is a popular buzz phrase these days—a term used to describe large volumes of data mined and analyzed for information and insights. The term "big data" may be new, but the concept isn't, and at the Naval Health Research Center (NHRC), we've been doing a lot with big data for over 35 years.

In 1980, Milan Miller, a researcher at NHRC, created a unique data resource to support epidemiological and longitudinal studies of health and performance in military personnel. That database is called the Career History and Archival Medical and Personnel System (CHAMPS) and contains personnel and medical data for millions of individuals who served on active duty in the United States Navy, Marine Corps, Army, Air Force and Coast Guard.

As of December 2014, CHAMPS contains data for over 10 million service members from the date they entered the military until their discharge from active duty. CHAMPS is a valuable resource for research focusing on medical management, occupational health, preventive medicine and epidemiology across the Department of Defense (DoD).

CHAMPS was just the beginning. NHRC researchers continually expand our data capabilities.

NHRC has a team of scientists and researchers who collect, analyze, and interpret health and medical data. With the databases and software applications developed at NHRC, our medical informatics capabilities include data management, medical planning, casualty estimation, casualty care and operational risk assessments, and medical intelligence for expeditionary medical planning and logistics. NHRC provides senior leaders and medical staff with accurate and reliable information to ensure they are ready to provide the right care and treatment at the right time and in the right place.

NHRC developed the Expeditionary Medical Encounter Database (EMED) to improve medical mission readiness. EMED provides accurate injury and clinical treatment data for casualties from

point of injury to definitive care and rehabilitation. The EMED has transformed into a high-quality data repository supporting studies on multiple topics, including:

- Injury prevention and mitigation
- Patient stream estimates
- Personal protective equipment evaluation
- Quality of life outcomes
- Clinical practice guidelines
- Determination of theater medical requirements



Michael Galarneau, director of operational readiness at Naval Health Research Center (NHRC). The Medical Modeling, Simulation and Mission Support Department within his directorate is responsible for most NHRC research dealing with big data. (U.S. Navy photo by Mayra A. Conde)

There's more to big data than just bytes and bits. Data mining—building models and algorithms that find patterns or relationships in data—is an indispensable component of big data and allows researchers to harness those bits and bytes and shape them into meaningful insights.

Putting Big Data to Work

The Joint Trauma Analysis and Prevention of Injury in Combat (JTAPIC), a DoD program and virtual partnership of 11 different organizations including NHRC, is supported by EMED. Using information from the database, researchers from NHRC's Medical Modeling Simulation and Mission Support Department can provide a comprehensive analysis of

combat-related injury events. The analysis provides leaders with vital information about specific scenarios to inform decision-making. One of JTAPIC's accomplishments includes substantial improvements to armored vehicles, resulting in many warfighters avoiding death or injury.

NHRC researchers have also created modeling and simulation tools that allow medical planners and logisticians to prepare for different operational scenarios, whether on land or sea or in support of combat or disaster relief operations. The Joint Medical Planning Tool (JMPT) and the Medical Planners' Toolkit (MPTk) each pull data from EMED and are fully accredited for DoD use.

Medical planners can use MPTk to estimate casualties across a range of military operations, from combat to humanitarian missions, to determine what supplies, equipment, and personnel are needed to manage casualties and ensure lifesaving medical care is available.

The JMPT, a computer-based simulation tool fully integrated with the MPTk, evaluates medical mission support by modeling patient flow from point of injury to definitive care. The JMPT is used to support research, medical systems analysis, operational risk assessment, and field medical services planning. Using the JMPT, military and medical leaders can

determine what type of military treatment facilities (battalion aid station, fleet hospital) will meet the needs of a specific patient stream; how relocating that facility will impact treatment; and how best to use personnel and transportation assets to manage the patient flow. Together, the JMPT and MPTk are powerful data analytics tools enabling DoD personnel to provide mission-appropriate medical support to save lives and mitigate injuries and illnesses.

From creating databases to developing tools for data mining and analyses, NHRC will continue to be on the leading-edge of big data and expand our medical informatics capabilities to optimize the health and readiness of our 21st century warfighters.



Part IV: The Mosquito Fighters

By André B. Sobocinski, Historian, BUMED

"Eighteen years ago we were a dozen or more medical students following a distinguished professor. . .through the wards of Charity Hospital, New Orleans. The professor came to the foot of a bed, glanced at the occupant, started and asked, 'Where did this come from?' Some one answered, 'From Havana,' we passed on without any unnecessary delay. I ...got one look at a yellow fever face, and the vivid picture has remained in my mind ever since. A very similar appearance is sometimes seen in men after a drunken debauch, sobering up, during the onset of a severe febrile disease."

~Surgeon John W. Ross, USN (1843-1920), 1886

Throughout the nineteenth century, military service in the Gulf Region and South Atlantic came with the guarantee of heat, humidity and exposure to mosquito-borne illness. With treatment options at the time ranging from bad to worse, the best hope for survival rested on a combination of rehydration and, ultimately, the body's ability to fight the infection.

The good news is if you survived a disease like Yellow Fever you would be bestowed with a life-long immunity which would almost certainly ensure future assignments in areas endemic with the disease.

In Navy history there are copious examples of "Yellow Fever-immune" personnel—especially doctors—spending extensive periods in Pensacola or with the Brazilian Squadron. The immunity was looked upon as a special skill that would enable safe access to the most at risk environments or populations.

When the Naval Hospital in Pensacola opened in 1826, a Yellow Fever-immune physician named Isaac Hulse was placed in charge; he would spend nearly 30 years at the hospital before dying of that other dread illness of the day, tuberculosis.



Dr. John Walton Ross (1843-1920) was one of the Navy's foremost tropical medicine specialist in the late nineteenth century who would play an unsung role in the Yellow Fever Commission's experiments at Las Animas Hospital, Cuba. Courtesy of National Library of Medicine.

Arguably one of the Navy's most significant of the Yellow Fever-immune physicians was John Walton Ross. Born in Clarksville, Tennessee, in 1843, Ross would serve with the 46th Arkansas Calvary under Lt. Col. John Crabtree in the Civil War. This was an experience that would forever change him.

Seeing soldiers on both sides of the conflict dying terrible deaths at the hand of disease reshaped his outlook and after the war, Ross set out to become a doctor. In 1870, he obtained a Medical Degree from the Medical College of Louisiana (Tulane), a school in the midst of formulating the very study of tropical disease. Upon graduation, Ross obtained a commission as an assistant surgeon in the U.S. Navy.

This was a period when Yellow Fever still appeared in epidemic form through much of the south. Throughout the 1870s, cities like New Orleans and Memphis were absolutely ravaged by the disease.

In the summer of 1878 Memphis was hit by its deadliest Yellow Fever epidemic on record. Over 17,000 of its citizens would be infected; among these thirty percent (5,100 people) would die. As citizens fled in panic, Ross took a leave of absence

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from the Navy to travel to the city. He worked with public health associations and local aid societies attending to victims, before he too became infected and, ultimately, developed the immunity that marked his career.

A year later, Secretary of the Navy Richard Thompson (1809-1900) commended Ross for his heroic service and advanced him eight positions on the naval promotion list.

Over the next three decades John Ross was the Navy's "answer" to Yellow Fever. Armed with immunity and first-hand knowledge of epidemics, he would travel to the very frontlines of the disease to treat victims—from Pensacola to Panama, Key West to Cuba.

As Ross was coming into his own, scientists like Robert Koch, Louis Pasteur and others were using microscopes to unlock the mysteries of illness. The focus of research was now directed at microbes, not miasma. In 1880, the French Army doctor Charles Alphonse Laveran discovered that malaria was caused by a protozoan. The disease's vector would however remain elusive until another physician named Ross focused his attention on the *Anopheles* mosquito in 1897.

Over in Cuba, Dr. Carlos Finlay was on the search for Yellow Fever's vector. Inspired by an existing theory that disease could be spread from an intermediate host, Finlay turned to the *Aedes Aegypti* mosquito—so prevalent on the island—and suspected it as the culprit. He first presented his "mosquito theory" at International Sanitary Conference held in Washington, DC in 1881.

Unfortunately, the medical profession was not yet ready and his theory languished for nearly two decades until some 40,000 Americans landed on Cuba in the Spanish-American War.

Over the three-month conflict, 400 Americans would be killed by bullets while over 2,000 would become infected with Yellow Fever. During the occupation period that followed, with Americans at risk, something needed to be done to end this scourge.

Enter Drs. John W. Ross, Carlos Finlay, and the U.S. Army's Yellow Fever Commission. In 1900, the Las Animas Hospital in

Havana, Cuba, would host one of the most important and controversial experiments in medical history. The invisible threat of the mosquito would soon be no more.

In addition to Yellow Fever, the *Aedes Aegypti* Mosquito has been linked to chikungunya, dengue, and Zika.



Cuban-physician Carlos Finlay. Finlay would be the first to propose the Mosquito Theory of illness. Courtesy of National Library of Medicine.

NMRC Sailors Get Their Degrees

By Lt. Nathanael Reynolds, Naval Medical Research Center, Biological Defense Research Directorate

SILVER SPRING, Md. - The summer season is anticipated throughout the year as a time of festive holidays, pleasant weather and family barbeques. The beginning of the season also signifies a time to relax and celebrate students' graduations following years of hard work invested in schooling. Here at the Naval Medical Research Center (NMRC), we also want to celebrate the accomplishments of our recent Active Duty graduates, completed while serving in their fulltime position within the R&D enterprise.

Hospital Corpsman, 2nd Class, Axel Garciavalenzuela graduated May 2016 with an Associate Degree in Medical Laboratory Technology from George Washington University. With this degree, Garcia was able to successfully complete the American Society for Clinical Pathology certification and he recently began a bachelor's degree program in Medical Laboratory Sciences. He hopes to apply for the Enlisted to the Medical Degree Preparatory Program at the Uniformed Services University. Garcia is currently stationed at NMRC's Biological Defense Research Directorate (BDRD) at Fort Detrick in Frederick, Maryland.

Hospital Corpsman, 2nd Class, Tania Rodeiro graduated in January 2016 *magna cum laude* with a Bachelor's Degree in Medical Laboratory Sciences from George Washington University. Rodeiro successfully completed the American Society for Clinical Pathology certification and has begun a Master's Degree in the Biotechnology program at Johns Hopkins University.

Rodeiro encourages other Sailors to, "Take advantage of the benefits provided by serving in the military to increase your education and career development."

Rodeiro is currently stationed at NMRC's BDRD at Fort Detrick, Maryland.

Hospital Corpsman 1st Class Olawale Diji graduated in May 2016 with a Master's Degree in Chemical and Life Sciences from the University of Maryland, College Park. Diji plans to leverage this degree to complete the American Society for



From left to right: HM2 Rodeiro, HM1 (FMF) Diji, HM2 Garcia, HM1 (FMF) Ravago, and HM1 (IDW) Fenelon.

Clinical Pathology certification as a medical laboratory scientist and to teach chemistry/biology courses on the high school and two-year college levels.

"Completing my degree has not only helped with promotion and my current position, but has also helped me plan for the future," said Diji.

Diji is currently stationed at NMRC's BDRD at Fort Detrick, Maryland.

Hospital Corpsman 1st Class Ezechiel Fenelon graduated in May 2016 with a Master's in Public Health from George Washington University. Fenelon looks to utilize his degree in global health policy and potentially apply for the Enlisted to Medical Degree Preparatory Program at the Uniformed Services University. Fenelon is currently stationed at NMRC's BDRD at Fort Detrick, Maryland.

Hospital Corpsman 3rd Class Dwight Mitchell graduated in June 2016 *cum laude* with a Bachelor's in Biology from the City College of New York. "My graduation was a culmination of hard work, sacrifice, determination and the thoughtful leadership of the people I

worked under," said Mitchell. "My advice to every Sailor is to set a target, talk to a college adviser, and take at least one class per semester. Make your education a priority; obtaining a degree is one of the best investments of your time because it pays you back monetarily and it gives you that sense of personal pride."

Mitchell serves as Acquisitions LPO and Diversity Officer at the Naval Submarine Medical Research Laboratory, Groton, Connecticut.

Hospital Corpsman 3rd Class Ashley Lindstrom graduated in May 2016 with a Bachelor's in Family and Child Development from Liberty University in Lynchburg, Virginia. Lindstrom is currently stationed at NMRC in Silver Spring, Maryland.

"This is one step closer to doing what I truly want and that is to become an officer. It also helps on what we all want to do and that is advance; a bachelor's degree will give you an additional four extra points on the next exam," said Lindstrom.

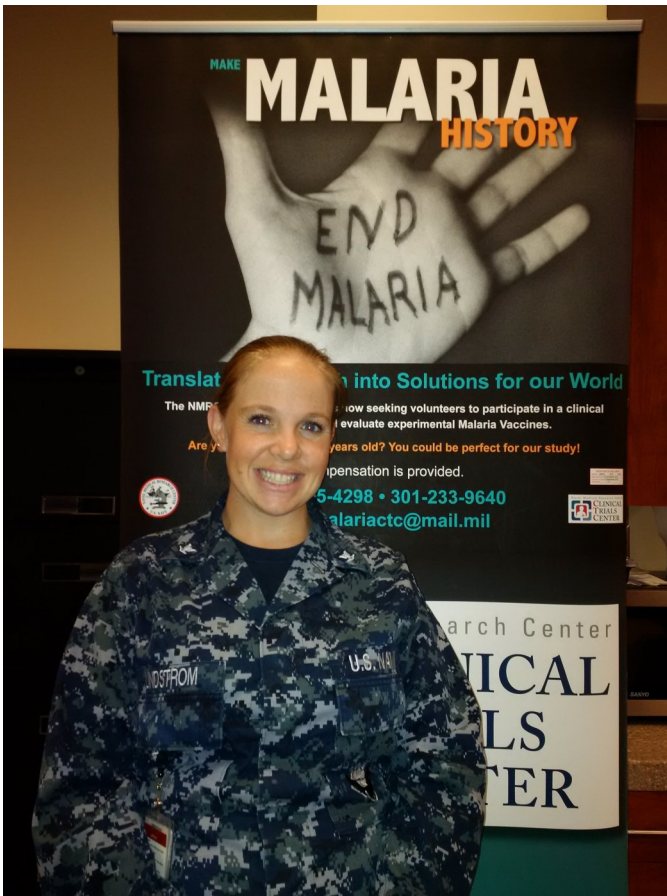
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Hospital Corpsman 2nd Class Anthony Harris graduated in July 2016 with an Associate Degree from Three Rivers Community College in Norwich, Connecticut. Harris plans to leverage the degree to prepare for the Enlisted to Medical Degree Preparatory Program. Harris serves as Supply LPO at the Naval Submarine Medical Research Laboratory, Groton, Connecticut.

Chief Navy Diver Ronald Byrum graduated in March 2016 with a Bachelor of Science Degree from Thomas Edison College, Trenton, New Jersey. Byrum serves as Research Dive Locker Chief at the Naval Submarine Medical Research Laboratory, Groton, Connecticut.

We are fortunate to have these talented individuals contributing to the NMRC mission and look forward to their promising careers. Congratulations graduates and enjoy your summer. You deserve it!



Left: Hospital Corpsman 3rd Class Ashley Lindstrom graduated in May 2016 with a Bachelor's in Family and Child Development from Liberty University, Lynchburg, Virginia.

Below: Chief Navy Diver Ronald Byrum, Hospital Corpsman 2nd Class Anthony Harris, and Hospital Corpsman 3rd Class Dwight Mitchell.



Change of Command at NAMRU-D

From Naval Medical Research Unit Dayton Public Affairs

DAYTON, Ohio – Staff, family, and colleagues of Naval Medical Research Unit Dayton (NAMRU-D) gathered June 3, 2016 for the third Change of Command ceremony since its formation in October 2010. Capt. Jeffrey Andrews, commanding officer (August 2013 – June 2016), was relieved by Capt. Rees Lee, former NARMU-D executive officer (June 2014 – June 2016) at Wright-Patterson Air Force Base, Ohio.

The ceremony's Presiding Officer, Capt. Jacqueline Rychnovsky, commanding officer, Naval Medical Research Center said, "When you look at NAMRU-D's accomplishments over the last few years under the leadership of Capt. Andrews, it's apparent that he and his team have contributed vastly to both Navy Medicine's Research and Development mission as well as having made assignment at Wright-Patterson Air Force Base a better place."

Rychnovsky presented Andrews with the Legion of Merit medal signed by C. Forrest Faison III, Vice Admiral, Medical Corps, United States Navy Chief, Bureau of Medicine and Surgery for performance of outstanding service.

Under Andrews' dynamic direction he promoted a healthy balance between work and family life, which led to NAMRU-D winning their second consecutive "When Work Works Award" for fostering a flexible work environment. NAMRU-D was one of two U.S. Navy commands selected for this award nationwide.

Andrews respectfully called each command member a "Kraken," an enormous mythical sea monster, during the ceremony. "To all the Krakens of NAMRU-D, I have only fond memories of our time together. I honestly loved my job and it loved me back



Left: Capt. Jacqueline Rychnovsky, commanding officer, Naval Medical Research Center, presents Capt. Jeffrey Andrews with the Legion of Merit medal. (Photo courtesy of NAMRU-D Public Affairs)

because you all made it that way," said Andrews. "Capt. Lee is the right man at the right time to lead you into an exciting future and continue the NAMRU-D tradition of excellence."

In keeping with Andrews' "Family first, Mission Always" attitude, Lee's command philosophy focuses on Family, Integrity and Trust.

"I am so very honored and humbled to have this opportunity to help move this mission forward," said Lee.

NAMRU-SA Scientist Celebrated with Top Paper of the Month Award

From NAMRU-San Antonio Public Affairs

SAN ANTONIO – R. Madelaine Paredes, Ph.D., a researcher in Naval Medical Research Unit San Antonio's (NAMRU-SA) Expeditionary and Trauma Medicine Department received a Combat Casualty Care Research Program coin from Lt. Col. (Dr.) Kevin Chung, Research Director, U.S. Army Institute of Surgical Research (ISR) at Joint Base San Antonio, Fort Sam Houston, for earning the *Top Paper of the Month*, June 29.

The paper, "Severe hemorrhagic shock induces acute activation and expansion of IL-8+/IL-10+ neutrophils with enhanced oxidative reactivity in non-human primates," was published in *Shock*.

This is the second *Top Paper of the Month*



R. Madelaine Paredes, Ph.D. (left), researcher in NAMRU-SA's Expeditionary and Trauma Medicine Department received a Combat Casualty Care Research Program coin from Lt. Col. (Dr.) Kevin Chung, Research Director, U.S. Army Institute of Surgical Research (right), for earning the Top Paper of the Month in June 2016. (Photo by LTC Kevin Akers, MD.)

award for NAMRU-San Antonio this year. The previous honor from ISR was awarded in February.

ISR celebrates the dissemination of research knowledge in the form of published manuscripts. The translation of knowledge gained through pre-clinical and clinical research to optimize combat casualty care is core to the ISR and NAMRU-SA missions.

NAMRU-SA scientist in Cellular and Immune Based Adjuncts for Casualty Care, Alexander J. Burdette, Ph.D. was also recognized for his translational research on analysis of inflammatory profile to hemorrhagic shock.

First Navy Week for Dayton and NAMRU-D

From Naval Medical Research Unit Dayton Public Affairs

DAYTON, Ohio – Naval Medical Research Unit Dayton (NAMRU-D) participated in the first Navy Week Dayton; June 13-17, 2016. NAMRU-D hosted Rear Adm. Victor Hall, Deputy Commander of Navy Medicine West. The Navy Week team was led by Navy Office of Community Outreach Rear Adm. J.R. Haley, Commander, Naval Air Force Atlantic, whom supported the senior flag officer.

NAMRU-D Commanding Officer, Capt. Rees Lee and Executive Officer, Cmdr. William Howard joined Hall on numerous visits with local industry, educational and government organizations, media outlets, civic groups and sport functions.

Leading off Navy Week was a Cincinnati Reds Baseball game June 12. Hall, an Ohio native and graduate from University of Cincinnati and Xavier University, provided the game ball delivery after Navy Band performed the National Anthem and the presenting of the colors.

Hall and Lee interacted with many game day attendees and exchanged sea stories with former and current shipmates.

Thirty Boy Scouts from three local troops were greeted by Hall, Lee, and Deputy Director of Aeromedical Research Directorate, Dr. Hank Williams, to tour the lab, June 13. Staff assisted in accruing the

Citizenship in the Nation Merit badge.

“I never want to leave!” said one younger Boy Scout.

On Tuesday, June 14, Hall and Lee met with the Dayton Area Chamber of Commerce members. Senior flag officer, Haley, addressed attendees and spoke on America’s Navy.

Next, Hall and Lee participated in a Navy-focused tour at the National Museum of the United States Air Force (NMUSAF).

NAMRU-D officers and scientists manned an interactive display table at the museum where visitors learned about NAMRU-D’s research devices such as a Reduced Oxygen Breathing Device, vision tests, and a motion sickness countermeasure device.

While at the museum, Hall and Lee met a U.S. Navy veteran. “All three of us happened to have served on destroyers, and that makes us fellow ‘tin can’ soldiers,” said Lee.

Positive ties were made with Montgomery County Commissioners, Dayton Mayor Nan Whaley, Dayton Minority Business



06/12/2016. RDML Victor Hall talking with a retired Navy shipmate right after delivering the game ball at the Cincinnati Reds Baseball game. (Photo courtesy of Public Affairs, Navy Medicine West)

Partnerships, Miami Valley Military Affairs Association and University of Dayton.

On Wednesday June 15, Lee, a pediatric pulmonologist, gave a grand rounds at Dayton Children’s Hospital on “Lessons from Military Pediatrics” to more than 20 residents. Dayton Children’s President, Deborah Feldman provided Hall and Lee with insight of workforce development and Lee discussed potential research collaboration with Dayton Children’s Hospital.

On Thursday, June 16, members of the Ohio Federal Research Network (OFRN) and Wright State University Research Institute (WSRI) met with Hall, Lee and Dr. Richard Arnold (NAMRU-D Aeromedical Research Director). Former 88th Air Base Wing Commander, WPAFB, Col. Cassie Barlow discussed the OFRN’s Ohio Federal Military Jobs Commission vision for retention and growth of federal-military agencies and missions including associate private sector jobs. University of Cincinnati, The Ohio State University, Air Force Institute of Technology and Wright State University human performance and human sciences professors briefed future research partnership before a tour of WSRI.

Navy Week Dayton concluded with NAMRU-D’s peak occasion, the Disorientation Research Device Ribbon Cutting ceremony, Friday, June 17 at NAMRU-D.

Dayton Boy Scout troops take (simulated) flight in NAMRU-D’s Spatial Disorientation Lab during a tour of Aeromedical Research Directorate, June 13, 2016 as part of NAMRU-D STEM outreach for Navy Week. (Photo courtesy of NAMRU-D Public Affairs)



Local Department of Defense Youth Program Explores Future Careers at NAMRU-D

By Naval Medical Research Unit Dayton Public Affairs

DAYTON, Ohio— During Navy Week Dayton, 22 elementary-age students from a Department of Defense Youth Program, STARBASE, visited the Naval Medical Research Unit Dayton (NAMRU-D) June 15.

The goal of the STARBASE program is to motivate youth to explore Science, Technology, Engineering and Math (STEM) as they continue their education and to interact with military personnel to explore careers and observe STEM applications.

Lt. Cmdr. Dustin Huber led the group on a tour of the Aeromedical Research Directorate. First stop, one of the three Hypoxia Countermeasures laboratories. Huber explained the psychological and physiological tests conducted with NAMRU-D's Reduced Oxygen Breathing Environment (ROBE), which is a 12 x 21

ft. sealed room capable of simulating altitudes from sea level up to 30,000 feet mean sea level.

Students were introduced to a Spatial Disorientation (SD) simulator, a virtual reality device used for research which uses geological analysis to mimic flying environments all over the world. Huber described the device as similar to a video game. He emphasized the impact research from this and other SD simulators have on flight safety.

“We want to take Sailors, Marines, and airmen and bring them home... We do our best to study ways to keep everyone safe,” said Huber.

Wrapping up STARBASE's trip to NAMRU-D was a visit to the Disorientation Research Device (DRD) and the Fatigue Mitigation lab. The students saw the 19 million dollar device

prior to its ribbon cutting ceremony on June 17. The DRD, also known as the Kraken, is a state of the art aeromedical research device that will be developed into a world class spatial disorientation countermeasures capability, allowing researchers to study how different types of motion affect the body.

At the fatigue mitigation lab, Huber explained how research helps military members perform efficiently and effectively while suffering from a lack of sleep.

The STARBASE youth departed NAMRU-D more knowledgeable about the general Navy mission as well as the world-class research opportunities available locally at NAMRU-D.



Naval Medical Research Unit Dayton welcomed local area elementary school students from Department of Defense Youth Program, STARBASE, to tour Aeromedical Research Directorate during Navy Week Dayton, June 15, 2016. (Photo courtesy of NAMRU-D Public Affairs)

The 'Kraken' is Unleashed at NAMRU-D!

By Naval Medical Research Unit Dayton Public Affairs

DAYTON, Ohio – On June 17 2016, Naval Medical Research Unit Dayton held a Ribbon Cutting Ceremony of the Disorientation Research Device (DRD), also known as the 'Kraken', at the Captain Ashton Graybiel Acceleration Research Facility at NAMRU-D on Wright-Patterson Air Force Base (WPAFB). This ultimate occasion wrapped up the first Navy Week Dayton (June 13-17 2016).

The facility honors Capt. Graybiel (1902-1995), former Director of NAMRU-D legacy command, Naval Aerospace Medicine Research Laboratory, Pensacola. "[His] team's research provided the vital human physiology knowledge so important to the success of the Mercury, Gemini and Apollo programs," said Capt. Rees Lee, Commanding Officer of NAMRU-D.

"The delivery of the DRD provides to the nation's research community the most advanced acceleration research device in the world," said Capt. Lee. "It is truly unique, allowing researchers to create the most realistic motion simulations ever seen using all 6-degrees of freedom and up to 3G's of force."

The guest speaker was Capt. Graybiel's son-in-law, Dr. James Lackner, Director of

the Ashton Graybiel Spatial Orientation Laboratory and long-time collaborator. Dr. Lackner gave a historical profile that addressed Capt. Lee's statement, "Concern regarding spatial disorientation and acceleration issues is real."

Rear Adm. John Haley, Commander of Naval Air Force Atlantic and Navy Week Dayton senior flag officer took to the lectern and remarked on the importance of Research & Development support for the safety of the warfighter.

Capt. Lee recognized those who contributed to the DRD development. Commander Richard Folga, DRD Program Manager, was awarded the Meritorious Service Medal for his service of managing "the construction of a 19 million dollar, 100 ton state of the art disorientation research device, allowing pivotal studies to be conducted on spatial disorientation – the number one cause of Class A Aviation mishaps" from Aug. 2012 – June 2016.

Cdr. Folga roared, "Release the Kraken!" and with that, the DRD came to life.

Once the DRD was secured Capt. Graybiel's daughter / Dr. Lackner's wife, Dr. Ann Graybiel properly christened the



06/17/2016. Dr. James Lackner, Director of the Ashton Graybiel Spatial Orientation Laboratory addresses guests at the Disorientation Research Device Ribbon Cutting Ceremony at Naval Medical Research Unit Dayton. (Photo courtesy of Wright Patterson AFB Public Affairs)

Kraken with a bottle of Kraken rum. Dr. Graybiel is a Neuroscientist and White House National Medal of Science awardee.

Among the 150 ceremony guests were: Rear Adm. Victor Hall, Commander of Navy Medicine West and Navy Week Dayton flag officer, the Naval Office of Community Outreach Navy Week team, 711th Human Performance Wing leadership, U.S. School of Aerospace Medicine's leadership, Army Aeromedical Research Laboratory's Commander Col. Malish, 88th Air Base Wing's Vice Commander Col. Elena Oberg, Environmental Techtonics Corporation's (ETC) CEO Mr. Robert Laurent and local government officials.

Following the ceremony, NAMRU-D tours were offered and guests were given the opportunity to securely drive the DRD in the control room under supervision.



The DRD, aka 'Kraken' can support several key Human Systems Integration domains & address several top aeromedical priorities. It is housed in the Captain Ashton Graybiel Acceleration Research Facility at NAMRU-D. (Photo courtesy of NAMRU-D Public Affairs)